

ART. I.—*The Influence of Light on Bacteria.*

BY ARTHUR DOWNES, M.D., AND THOS. P. BLUNT, M.A.  
F.C.S.

[Read 12th April, 1883.]

IN the *Proceedings of the Royal Society of London* (Vol. XXVI., 1877, p. 488, and Vol. XXVIII., 1878, p. 199) we reported the results of an investigation from which we concluded that light is inimical to the development of *Bacteria*, and, probably, injurious to “unprotected” protoplasm generally.

Dr. J. Jamieson, in a paper recently read before the Royal Society of Victoria, attacks our inferences, attributing the observed effects not to light but to solar heat.

We scarcely think that Dr. Jamieson can have seen the text of our papers, or he would have noted that in nearly every experiment of the long series special care was taken to exclude so fundamental an error as that which he attributes to us.

Without troubling the Society with a long communication, we think that a consideration of two facts alone will show that Dr. Jamieson’s criticism cannot be substantiated.

In our experiments our usual method of procedure was to place in each of a number of test-tubes a small quantity of cultivation liquid. The tubes were then plugged with cotton wool, loosely capsuled, and divided into two sets. The one set were encased, each tube separately, in thin, tarnished leadfoil (such as paperhangers use for damp walls) so as to thoroughly exclude light. The two sets were exposed side by side to full sunlight. When the insolation was sufficient the uncovered tubes remained clear for an indefinite period, while the encased speedily swarmed with *Bacteria*.

Now, if Dr. Jamieson will compare the temperature of two tubes—encased and non-encased respectively—exposed to the solar rays, he will find that the former becomes slightly the hotter.

This in itself disposes of his theory that the germinal matter in the non-encased tubes is destroyed by solar *heat*; for if that heat were sufficient for such a result, it should obviously suffice also for the destruction of germs contained in the encased cultivation liquid.

Professor Tyndall, in repeating our experiments, is forced to the same conclusion, namely—that the energy which here prevents putrefaction is energy in the radiant form.

Secondly, Dr. Jamieson will find in the second of the papers in the *Proceedings of the Royal Society* details of experiments which distinctly show that the waves of greatest refrangibility are the most active; in other words, to use the old phraseology, that the effect is associated chiefly with the “actinic” rays. This fact, which may readily be substantiated by any one who will carefully repeat our experiments, must again prove that Dr. Jamieson’s supposition of heat destruction is quite untenable.

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ART. II.—*The Influence of Light on Bacteria.*

BY JAMES JAMIESON, M.D.

[Read 12th April, 1883.]

At the meeting of this Society on 8th June last I read a paper on this subject, in which I detailed the results of certain experiments, made for the purpose of testing the conclusions arrived at by Professor Tyndall, and by Messrs. Downes and Blunt. I was led at first to agree fully with these gentlemen, that the effect of exposure to the sun’s rays of solutions inoculated with bacterial germs is to prevent the development of the bacteria. Continued observation, however, showed me that the fullest exposure to diffused light has no such effect; and, further, that long continued exposure to the direct rays of the sun need not have that effect. Finding, also, that insolation seemed to fail when the temperature was moderate in degree, I was led, perhaps